

instrument; and

A4
Amended,
a digital signal processor coupled to said third microphone and adapted to apply said [averaged] digital filter [algorithm] algorithms averaged by said processor to signals from said third microphone.

25. (Amended) An equalizer system comprising:

a low-pass filter adapted to receive an input signal;

a high-pass filter coupled in parallel to said low-pass filter and adapted to receive said input signal;

wherein a frequency pole of said low-pass filter and a frequency pole of said high-pass filter are controlled independently from each other; and

a summation device adapted to receive output signals from said low-pass filter and said high-pass filter.

A5
27. (Amended) The system of claim [26] 25 wherein said low-pass filter and said high-pass filter are additionally controlled by modifying [at least one of] a [frequency and] gain of said filters.

REMARKS

Claims 1-25 and 27 remain in the application. Claim 26 has been canceled. Claims 1, 16, 21, 24-25, and 27 have been amended.

Claim Rejections Under 35 U.S.C. § 112, second paragraph

Claims 16-24 were rejected as failing to distinctly claim the invention under 35 U.S.C. § 112, second paragraph. Claims 16 and 21 have been amended so that the preamble refers to “instruments” as opposed to “instrument.” Claim 24 has been amended to correct a perceived antecedent problem with the phrase “said averaged digital filter algorithm.” The rejection of claims 19, 20, and 23 is not understood. At page 27 of the specification, an example of an algorithm is described as a digital filter algorithm. Such an algorithm includes components related to frequency and gain. Two or more such algorithms can be averaged together based on the teachings of the present application. Creating such an average is a distinct advantage recited in claims 19 and 23 in that such an averaged algorithm may be available at a later time to modify an input signal. The use of such an algorithm is recited in claim 20. Based on the amendments and arguments above, reconsideration and withdrawal of the rejection of claims 16-24 under 35 U.S.C. § 112, second paragraph is respectfully requested.

Rejections Under 35 U.S.C. §§ 102(e) and 103 (a)

Claims 25-27 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,714,918 to Menkhoff (“Menkhoff”). Claims 1-5 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,340,780 to Odlen (“Odlen”). Claims 1, 6-11, 13-18, 21-22 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,506,910 to Miller et al. (“Miller”). Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller in view of U.S. Patent No. 5,537,614 to Hagimori (“Hagimori”). These rejections are traversed, in part, because the cited references fail to teach or suggest a microphone-tailored

equalizing system and method as recited in the pending claims.

The Present Invention

Generally, a microphone can be placed at a position that is “optimal” for receiving the acoustic sounds emanating from an acoustic instrument. For example, for an acoustic guitar, such a position may be perpendicular from the sound hole of the guitar and a distance away equal to the length of the guitar. Though potentially an optimal placement for the microphone, such a placement may not be practical in a given environment. This may be due to at least two factors:

1. The guitar may be moved while it is played, thus putting the microphone out of its optimal position, and
2. Other instruments or sound sources may be present that would add to the acoustic sound picked up by the microphone.

According to an embodiment of the present invention, a method is presented, which provides for a better output signal for the microphone. Instead of trying to place the microphone at the optimal location, it can be placed proximately to the instrument so that the factors set forth above may be avoided. Then, sounds played from the instrument (and picked up by the microphone) can be compared with reference sounds for the instrument (e.g., as retrieved in a perfect playing atmosphere with an optimal microphone placement). With this information a tailor-made equalizer may be designed to compensate for the differences between the two sound sources. By applying such an equalizer to a microphone, the signal output by the microphone can be made to be more like the output of an optimally placed microphone in a perfect playing atmosphere.

Menkhoff

In discussing the Menkhoff reference, Applicant is not making a representation that the

Menkhoff reference has a filing date that predates the invention date for the presently claimed invention. Menkhoff refers to an equalizer for digitized signals. In Fig. 6 of this reference, Menkhoff describes an input signal for the equalizer at "E" is supplied to a high-pass and a low-pass filter. The outputs of these filters are amplified under the control of a control unit and input to a second low-pass filter and high-pass filter before being amplified again and output.

Odlen

Odlen describes a self-correcting audio equalizer. A sound source is passed through a feedback controlled attenuator before passing to a speaker the output of the speaker, affected by the listening environment, is picked up by a microphone. The amplitude of the received signal is compared to the amplitude of the sound source and the attenuator is thus modified to correct for the deficiency. This concept can be expanded beyond general amplitude control to amplitude control for a plurality of frequency bands (i.e., as in an equalizer).

Miller

Miller refers to an automatic equalizer. As seen in Fig. 1, a sound source provides input from a musical instrument into a narrow band reject filter (a notch filter). A sine wave having a known amplitude is added to the signal in the notched frequency band and played through a speaker. A microphone detects the signal and then provides it to a sine wave detector, which determines the amplitude of the added sine wave at the microphone. The amplitude of that frequency can then be controlled based on the comparison of the "sent" sine wave and the "received" sine wave.

Hagimori

Hagimori refers to a signal level display unit. The unit is able to display signal levels for a variety of frequency bands.

Argument

With respect to claims 25-27, claim 25 has been amended to include the limitations of claim 26 to further bring out this particular feature of the present invention. Claim 25, as amended, recites that a frequency pole of a low-pass filter and a frequency pole of a high-pass filter are controlled independently of one another. Such a feature is not described or suggested in Menkhoff, where the poles of the high pass and low pass filters are not controlled, if they are controlled at all, independently of each other.

With respect to claim 1, this claim refers to the comparison of sounds coming from a musical instrument as picked up by a microphone and reference sounds of the instrument. Odlen, does not address this situation at all. In Odlen, a musical instrument may be played as a source, but the output of the speaker is compared to the electrical output of the microphone near the instrument, not the acoustic output of the instrument. In Odlen, there is no mention of an acoustic instrument at all. This is much the same situation in Miller, where a specific frequency band played through the speaker is compared to the same signal before it is played through the speaker. To further bring out the reference feature of the present invention, claim 1 has been amended to state that the reference sounds of the instrument are played separately from the playing of the musical instrument (which is picked up by the first microphone).

With respect to claims 5 and 10, neither Odlen or Miller discuss in any way the repeating of the comparison steps with different musical instrument to determine adjustment ranges for

sections of the tailor-made equalizer. The comment at page 4 of the Office Action that “the equalizer could be set for that instrument and corresponding equalizers could be set for other instruments” misses this point. These claims are not directed to several equalizers, but are instead directed to one equalizer and several instruments.

With respect to claims 6 and 16, the Office Action points to two microphones, however, it is clear that the signals from the two microphones are not being compared together as recited in these claims. In Miller, an input signal is prepared (e.g., recorded material or material input from a microphone 28). This input signal is modified by notching out a frequency band and substituting a new signal in its place. Any comparison that is done is not of the original signal and the one received at microphone 40, but rather the signal generated to fill the notch and that signal as it is received at the microphone 40. Claims 6 and 16 clearly recite the comparison of first and second audio recordings from first and second microphones, a feature not shown or suggested by Miller.

With respect to claim 13, this claim refers particularly to an equalizer that has been designed to specifically compensate for differences in the electronic reproduction by the microphone of sounds to be picked up by the microphone and reference sounds from the type of musical instrument. Claim 13 has been amended to bring out this feature of the comparison. Though Miller may include the input of music from an instrument, there is nothing in Miller that teaches or discusses this type of comparison (see the arguments with respect to claim 1, above) as well as to an equalizer having a particular arrangement to compensate for the differences. Moreover, the equalizer of claim 13 is designed specifically for a preselected type of acoustic musical instrument, another feature not remotely suggested by Miller.

In view of the above, reconsideration and withdrawal of the rejection of claims 1-18 and

21-27 under 35 U.S.C. §§ 102(e) and 103(a) is respectfully requested.

CONCLUSION

For all the above reasons, the Applicant respectfully submits that this application is in condition for allowance. A Notice of Allowance is earnestly solicited.

The Examiner is invited to contact the undersigned at (408) 975-7500 to discuss any matter concerning this application. The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. § 1.16 or § 1.17 to Deposit Account No. 11-0600.

Respectfully submitted,
KENYON & KENYON

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By: Shawn W. O'Dowd
Shawn W. O'Dowd
Reg. No. 34,687

KENYON & KENYON
333 West San Carlos St.
San Jose, CA 95110
(408) 975-7500 telephone
(408) 975-7501 facsimile